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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/920,762	08/03/2001	Takashi Kitaguchi	212135US2	5946

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EXAMINER	
STOCK JR, GORDON J	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 11/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/920,762	KITAGUCHI ET AL.	
	Examiner	Art Unit	
	Gordon J. Stock	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *8/15/06;9/27/06*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-34* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 September 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 9/27/06
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment received on August 15, 2006 has been entered into the record.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on September 27, 2006 is being considered by the examiner.

Claim Objections

3. **Claims 16 and 20** are objected to for the following: in **claim 16** on lines 1-2 'in which a program for measuring a three-dimensional shape of an object through computer' is ungrammatical. Examiner has interpreted this phrase as –comprising a program for measuring a three-dimensional shape of an object with a computer-. In **claim 20** on line 2 'said program' lacks antecedent basis. Corrections are required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. **Claims 1-4, 7-8, 10, 12-14, 16, 19, 21, 22, 25-28, 31, 32** are rejected under 35 U.S.C. 102(b) as being anticipated by **Kawaguchi (JP 2000-171924 –using machine translation of Detailed Description)—cited by applicant.**

As for **claims 1, 13, and 14,** Kawaguchi in a three-dimensional image measurement system discloses the following: a picture taking part taking a picture of the object at least first and second positions with second position taking a picture of at least a portion of the object not

taken at the first position, a moiré camera comprising CCD camera (paragraphs 0034-0035; Fig. 6: two images composed together; Fig. 1: 20, 24); a projecting part applying light having a predetermined pattern onto the object (Fig. 1: 22); a picture taking position specifying part detecting a position at which said picture taking part takes the picture of the object, and generating position information specifying the position (Fig. 1: 26); a three-dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object based on the position information and an image taken at the position specified by the position information (paragraph 0023-0024; paragraph 0035); a three dimensional shape composing part expressing, by a coordinate in single coordinate of each point of the object calculated by said three-dimensional coordinate calculating part for the at least the first and second different positions and to produce a composed image (paragraphs 0036-0039; Fig. 1: 30, 32; Fig. 6).

As for **claim 2**, Kawaguchi discloses everything as above (see **claim 1**). In addition, he discloses a picture taking control part controlling operation timing of said picture taking part, shutter control (paragraph 0018); a signal converting part converting an analog signal obtained by said camera into a digital signal (paragraphs 0032-0033; Fig. 1: 24: CCD digital camera); a storing part storing the digital signal, three-dimensional coordinate and composite image (paragraphs 0048-0049).

As for **claim 3**, Kawaguchi discloses everything as above (see **claim 2**). In addition, he discloses an interpolation part performing interpolation processing on at least one of the image obtained by said camera and the composite image obtained by said three-dimensional shape composing part (Fig. 8: demonstrates interpolation; paragraph 0027with least square method and paragraphs 0040-0041).

As for **claim 4**, Kawaguchi discloses everything as above (see **claim 1**). In addition, he discloses generating a three-dimensional image of the object in accordance with coordinates of the object obtained by said three-dimensional coordinate calculating part and an image obtained when the light having the predetermined pattern is not applied to the object (paragraphs 0048 and 0050).

As for **claim 7**, Kawaguchi in a three-dimensional image measurement system discloses the following: a picture taking part taking a picture of the object at least first and second positions with second position taking a picture of at least a portion of the object not taken at the first position, a moiré camera comprising CCD camera (paragraphs 0034-0035; Fig. 6: two images composed together; Fig. 1: 20, 24); a projecting part applying light having a predetermined pattern onto the object (Fig. 1: 22); a picture taking position specifying part detecting a position at which said picture taking part takes the picture of the object, and generating position information specifying the position (Fig. 1: 26); a computer (Fig. 1: 30, 32) with a three-dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object based on the position information and an image taken at the position specified by the position information (paragraph 0023-0024; paragraph 0035); a three dimensional shape composing part expressing, by a coordinate in single coordinate of each point of the object calculated by said three-dimensional coordinate calculating part for the at least the first and second different positions and to produce a composed image (paragraphs 0036-0039; Fig. 6).

As for **claim 8**, Kawaguchi discloses everything as above (see **claim 7**). In addition, he discloses said computer comprises an interpolation part performing interpolation processing on

at least one of the image obtained by said camera and the composite image obtained by said three-dimensional shape composing part (Fig. 8: demonstrates interpolation; paragraph 0027 with least square method and paragraphs 0040-0041).

As for **claim 10**, Kawaguchi in a three-dimensional image measurement system discloses the following: a picture taking part taking a picture of the object at least first and second positions with second position taking a picture of at least a portion of the object not taken at the first position, a moiré camera comprising CCD camera (paragraphs 0034-0035; Fig. 6: two images composed together; Fig. 1: 20, 24); a projecting part applying light having a predetermined pattern onto the object (Fig. 1: 22); a picture taking position specifying part detecting a position at which said picture taking part takes the picture of the object, and generating position information specifying the position (Fig. 1: 26); a storing part storing the digital signal, three-dimensional coordinate and composite image (paragraphs 0048-0049); a three-dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object based on the position information and an image taken at the position specified by the position information (paragraph 0023-0024; paragraph 0035); a three dimensional shape composing part expressing, by a coordinate in single coordinate of each point of the object calculated by said three-dimensional coordinate calculating part for the at least the first and second different positions and to produce a composed image (paragraphs 0036-0039; Fig. 1: 30, 32; Fig. 6).

As for **claim 12**, Kawaguchi discloses everything as above (see **claim 10**). In addition, he demonstrates the camera takes a picture when the light having the predetermined pattern is not applied to the object (paragraphs 0048 and 0050).

As for **claim 16**, Kawaguchi discloses computer readable medium (paragraphs 0048-0049) as well as computer based algorithm (Fig. 7 with Fig. 1: 30, 32); wherein, there are calculating of a three-dimensional coordinate of each point of the object based on the position information and an image taken at the position specified by the position information (paragraph 0023-0024; paragraph 0035) and expressing, by a coordinate in single coordinate of each point of the object calculated for the at least the first and second different positions and to produce a composed image (paragraphs 0036-0039; Fig. 1: 30, 32; Fig. 6).

As for **claim 19**, Kawaguchi discloses everything as above (see **claim 16**). In addition, he discloses generating a three-dimensional image of the object in accordance with coordinates of the object obtained by said three-dimensional coordinate calculating part and an image obtained when the light having the predetermined pattern is not applied to the object (paragraphs 0048 and 0050).

As for **claims 21, 22, 25, 26, 27, 28, 31, 32,** Kawaguchi discloses everything as above (see **claims 1, 7, 13, and 16**). In addition, he discloses that the computer calculates rotational components based on respective attitude angles and translational components (paragraphs 0018, 0030-0033, 0035).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. **Claims 5, 6, 15, 20, 23, 24, 29, 30, 33, 34** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Fitts (5,175,601)** in view **Kawaguchi (JP 2000-171924 –using machine translation of Detailed Description)—cited by applicant.**

As for **claims 5 and 15,** Fitts in a high-speed 3-D surface measurement surface inspection and reverse-CAD system discloses the following: a plurality of picture taking parts with different optical centers taking pictures of the object (Fig. 1: 2, 3); a projecting part applying light having a predetermined pattern onto the object (Fig. 1: 4, 10); a picture taking position specifying part detecting positions at which said plurality of picture taking parts take the picture of the object, and generating position information specifying the respective positions (Fig. 1: 17, 16); a three dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object for each image based on a plurality of images obtained as a result of pictures of the object being taken by said plurality of picture taking parts and the position information generated by said picture taking position specifying part (Fig. 1: 15 and 16); a three-dimensional shape composing part expressing, by a coordinate in a single coordinate system, a three-dimensional coordinate of each point of the object calculated by said three-dimensional coordinate calculating part to produce a composed image (Fig. 1: 19 from 16; Fig. 6: composed image of car on computer display). Fitts does not explicitly state the composed image is from at least first and second positions wherein, the second position takes at least a portion of the object different than the first. However, he suggests this for 3-D image depicted in the display in Fig. 6 is larger than the area being illuminated by the projector. In addition, Kawaguchi in a 3D image measurement system teaches having composite images from two different portions of the object being inspected (Fig. 6). Therefore, it would be obvious to one of

ordinary skill in the art that at least two different positions were used to take pictures of the car door in order to produce a composite image of the whole car.

As for **claim 6**, Fitts in view of Kawaguchi discloses everything as above (see **claim 5**). In addition, Kawaguchi discloses a plurality of picture taking control parts controlling operation timing of said plurality of picture taking parts (col. 8, lines 25-30); a plurality of signal converting parts converting analog signals into digital signals (col. 8, lines 42-45); a storing part storing the digital signals obtained by said plurality of signal converting parts, three dimensional coordinate calculated by said three-dimensional coordinate calculating part and composite image generated by said three-dimensional shape composing part (Fig. 1: 14 and 18).

As for **claim 20**, Fitts discloses the following: a three dimensional coordinate calculating part calculating a three-dimensional coordinate of each point of the object for each image based on a plurality of images obtained as a result of pictures of the object being taken by said plurality of picture taking parts and the position information generated by said picture taking position specifying part (Fig. 1: 15 and 16); a three-dimensional shape composing part expressing, by a coordinate in a single coordinate system, a three-dimensional coordinate of each point of the object calculated by said three-dimensional coordinate calculating part to produce a composed image (Fig. 1: 19 from 16; Fig. 6: composed image of car on computer display). Fitts does not explicitly state the composed image is from at least first and second positions wherein, the second position takes at least a portion of the object different than the first. However, he suggests this for 3-D image depicted in the display in Fig. 6 is larger than the area being illuminated by the projector. In addition, Kawaguchi in a 3D image measurement system teaches having composite images from two different portions of the object being inspected (Fig. 6).

Therefore, it would be obvious to one of ordinary skill in the art that at least two different positions were used to take pictures of the car door in order to produce a composite image of the whole car.

As for the calculating and expressing steps incorporated into a program on a computer readable medium, Fitts does not explicitly state this. However, he does teach that computer processors as well as computer-aided-design functions are performed (col. 8, lines 40-66). And Kawaguchi discloses programs being on storage medium (paragraph 0048). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the calculating and expressing steps incorporated in a program on a computer readable medium in order to program the computer to process the image and coordinate data.

As for **claims 23, 24, 29, 30, 33, 34,** Fitts in view of Kawaguchi discloses everything as above (see claims 5, 15, 20). In addition, Fitts discloses using positional data (Fig. 1: 17). Fitts is silent concerning calculating rotational/translational components based on respective angles and positions of the camera. However, Kawaguchi discloses that the computer calculates rotational components based on respective attitude angles and translational components (paragraphs 0018, 0030-0033, 0035). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the computer calculate rotational and translational components based on angle and pose of the camera in order to accurately determine the 3D coordinates of the object in relation to the camera's position.

8. **Claims 9 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kawaguchi (JP 2000-171924 –using machine translation of Detailed Description)—cited by**

applicant in view of **Geng (6,700,669)—previously cited** and **Kumar et al. (6,522,787)-previously cited.**

As for **claims 9 and 11**, Kawaguchi discloses everything as above (see claims 7 and 10). He is silent concerning the picture taking position-specifying part being controlled by the external computer. However, Geng in a method of three-dimensional imaging teaches an external control signal for frame grabbing (Fig. 10b: 5) and Kumar in a method of combining images teaches external control by a computer (Fig. 5). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to provide external computer control in order to control frame rate and or to correct camera pose.

9. **Claims 17-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Kawaguchi (JP 2000-171924 –using machine translation of Detailed Description)—cited by applicant** in view of in view of **Kitaguchi et al. (6,038,074)-cited by applicant.**

As for **claims 17-18,** Kawaguchi discloses everything as above (see **claim 16**). In addition, Kawaguchi discloses an acceleration sensor (paragraph 0030). He is silent concerning a magnetic and angular velocity sensor. However, Kitaguchi in a three-dimensional measuring apparatus teaches using an acceleration sensor, magnetic sensor, and angular velocity sensor to detect a rotational angular velocity around each coordinate axis of the three dimensional coordinate system (col. 10, lines 35-45; col. 15, line 15-30; Fig. 25; 186-188; col. 36, lines 1-35). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a magnetic sensor, and angular velocity sensor in order to accurately determine the position of the camera in relation to the object being imaged.

Response to Arguments

10. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: U.S. Patent 5,852,672 to Lu

U.S. Patent 6,141,105 to Yahashi et al.

U.S. Patent 6,914,685 to Chang

U.S. Patent 6,980,302 to Knighton et al.

U.S. Patent 7,123,292 to Seeger et al.

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and

2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: **(571) 273-8300**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431. The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached at 571-272-2800 ext 77.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gs
October 28, 2006

Gregory J. Toatley, Jr.
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